10BII Calc

©2008,2009 Ernest Brock

Acorn Aircraft **acornaircraft@me.com** http://web.mac.com/acornaircraft/AcornAircraftSite/Acorn_Aircraft.html

Table of Contents

Introduction 2

Calc10BII Layout 3

Home Keyboard 5

Bond Keyboard 9

Cash Flow Keyboard 11

Conversion Keyboard 12

Depreciation Keyboard 13

Math Keyboard 14

Stats Keyboard 17

tvm Keyboard 19

Amortization Table 20

print tape 21

Information Screens 22

Sample Problems 25

Introduction

Calc10BII is a business calculator featuring over 100 built-in functions for business, finance, mathematics and statistics. Easily calculate loan payments, interest rates, amortization, discounted cash-flow analyses, TVM (loans, savings, and leasing) using a simplified algebraic entry system. The keyboard and display have been carefully optimized for the iPhone and iPod Touch. Five different keyboard layouts allow you to do much more than a 10BII calculator while maintaining compatibility with the standard.

Features:

Time Value of Money- Loans, savings, leases and amortization schedules using both the standard keyboard and a specialized TVM solver window that displays the contents of all the variables for rapid "what if" solutions to your problems.

Interest Conversion- Nominal and effective rates.

Cash Flows- Net present value and internal rate of return. Up to 40 cash flows are easily edited and reviewed using the dedicated cash flow editor screen. Entries are added, deleted and modified in a scrolling display with a touch interface unique to the iPhone.

Business Percentages- Percent change, markup, and margin calculations.

Statistics- Mean, standard deviation, correlation coefficient, and linear regression forecasting, weighted mean.

Conversions- 47 world currency rates and over 100 commonly used metric, english and other conversion factors used in financial, business, scientific and engineering calculations.

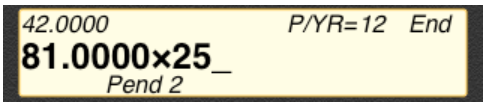
Scientific- sin, cos, tan, asin, acos, atan plus the hyperbolic trig functions, conversion between rectangular and polar coordinates, conversion between degrees and radians, time functions including h.ms+ and h.ms-, log, ln, 10^x, e^x, y^x, x root of y, fraction part and integer part. Trig functions can be computed in radians, degrees or gradians.

Calc10BII Layout

Calc10BII has 9 keyboards/ screens. A keyboard is selected by touching the **blue** key followed by **home**, **tvm**, **CF**, **conv**, **math**, **stats**, **depr**, **prt tape** or **bond**.

The **orange** and **blue** keys work as shift keys. Touch the **orange** or **blue** key once to select shift (a colored halo around the key indicates it is selected). Touch the shift key a second time to cancel the shift. When a shift key is selected, the functions displayed in blue or orange are enabled on the keyboard. For example, touch **orange** followed by + to execute the square root function.

The area at the top of the screen displays a variety of annunciators, the main results line and a secondary results line for functions that return 2 values.



Annunciators

Input
After touching the input key, the secondary results line displays the input value.

Pend
The pending annunciator displays the number of pending operations in the display line. Up to 20 operations can be pending.

Begin
The begin/end annunciator indicates that payments occur at the beginning or end of the a period. Touch this annunciator to alternate between begin and end modes of computation.

P/YR
This annunciator shows the current setting of the P/YR parameter.

Amort
The amort annunciator displays immediately after performing the amort function. It displays PER for period, PRIN for principal, INT for interest and BAL for balance.

C-FLOW
The cash flow annunciator indicates the current cash flow entry number after touching CFj or Nj.

Deg
In math mode the degree annunciator indicates the angular mode in effect- degrees, radians or gradians. Touch it to change the angular mode.

LastOp
The last operation annunciator displays the last operation that was performed. (lower right)

Errors
Errors in operation are indicated either by a pop up alert message or by a numeric display of **nan** or **inf**. For example, 2.÷0.= returns a result of **inf**. -2y^x.5= returns **nan**

Numeric Displays

There are two numeric display lines. The main line displays all pending operations and the final results. If more operations are pending than can be displayed, the display scrolls to the left, indicated by ... A secondary smaller numeric display line appears above the main display after operations that return 2 values. You can move the secondary value to the main numeric line using **SWAP**

The numeric display shows a number of decimal places from 0 to 13. The number of digits displayed to the right of the decimal is selected by touching **orange DISP** followed by 0 - 8. To display all available digits touch **DISP** decimal point. To activate the floating decimal display, touch **DISP** 9.

To temporarily see all available digits, touch **DISP** then touch and leave your finger down on the equal key. When you lift your finger, the display will revert to the selected number of decimal places.

Touch **orange ./,** to change the decimal point radix from period to comma. The separator between each 3 digits of the mantissa also changes between comma and period.

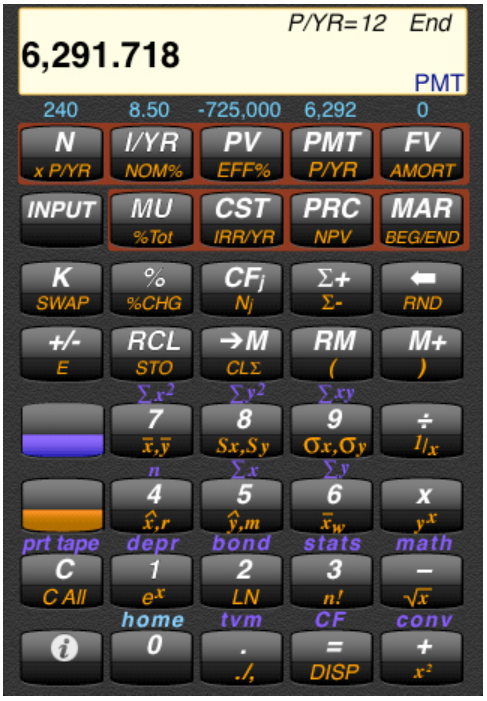
Touch keys to enter numbers and operations into the main display. A negative number is entered by first touching the number then the **+/-** key. A number can also be entered in scientific mode by touching the number then **E** followed by an exponent. Enter a negative exponent by touching **+/-** after touching **E**.

Use the paren keys **( )** to group computations. All pending operations are displayed on the main line.

The ← (back arrow) key erases the last digit or operation from the main display line.

Touch **=** to finalize a computation.

Home Keyboard



The home keyboard has the standard 10BII function keys.

TVM keys

Time value of money keys are dual operation keys. If you enter a number then touch one of the TVM keys the number will be stored in the register associated with that key. If you touch a key without first entering a number, a value will be computed and displayed for that function.

The current setting of of N, I/YR, PV, PMT and FV is displayed immediately above each of the keys. The display above the keys is rounded to the nearest integer. The full value is stored in the calculator and can be viewed by recalling it to the display using RCL.

N stores/computes the number of periods
I/YR stores/computes the interest rate per year
PV stores/computes the present value
PMT stores/computes the payment
FV stores/computes the future value

You must set 4 of the 5 variables and properly initialize the 2 modifiers P/YR and BEG/END before solving any tvm problem.

P/YR

stores the number of periods per year. Set it to 1 for annual payments, 12 for monthly payments. The current setting of P/YR is always displayed in the annunciator at the top right of the display area.

xP/YR

stores entered value multiplied by the number of periods in N. For example if P/YR is 12, touch 30 **xP/YR** to store 360 in N.

BEG/END

changes TVM computations to make pmt at beginning or end of the periods. You can also touch the begin/end annunciator to change modes.

Note: The most common error in computing TVM problems is improperly setting BEG/END and/or P/YR. Please double check these values before reporting a calculator error.

Percentage Keys

%

converts last entry to a percentage by dividing it by 100. If the last entry was + or -, % computes the percentage of the previous number on the display line.

%Tot

the portion that one number is of another expressed as a total. Enter the total, touch **INPUT** then enter the portion followed by **%Tot**

%CHG

the difference between two numbers, expressed as a percentage of input value. Enter the first value, touch **INPUT** then enter the second number. Touch **%CHG**

Markup, Cost, Price and Margin Keys

CST stores/computes the cost
PRC stores/computes the price
MU stores/computes the mark up
MAR stores/computes the margin
Store values into any 2 and compute the 3rd.

Memory Keys

The memory keys are used to access the calculator storage locations. There are 10 general and 1 dedicated storage locations. In addition you can access the N, I/YR, PV, PMT, FV, P/YR, CST, MU, PRC and 20 of the 80 cash flow registers.

RCL

recalls a number from storage. Touch RCL followed by a number 0 - 9 to access the general registers. Touch RCL followed by N, I/YR, PV, PMT, FV, P/YR, CST, MU, PRC to recall a specialized register. Touch RCL CFj followed by 0-9 or .0-.9 to recall cash flow 0-9 or 10-20.

STO

stores the currently displayed value to a memory location. Touch STO followed by a number 0 - 9 to store in the general registers. Touch STO followed by N, I/YR, PV, PMT, FV, P/YR, CST, MU, PRC to store in a specialized register. Touch STO CFj followed by 0 - 9 or .0 - .9 to store the displayed value in cash flow 0 - 9 or 10 - 20. To change the cash flow repeat value for the cash flow just stored, enter the value then touch Nj.

STO+
STO-
STOx
STO÷

perform register arithmetic by touching STO followed by + - x ÷ followed by a valid register number/name.

->M

stores displayed value in dedicated memory

RM

recalls the dedicated memory to the display

M+

adds displayed value to the dedicated memory

K

stores a constant operation of +num, -num, xnum, ÷num, +num%, -num%, x num%, ÷num%, y^x num, Example: touch **12 + 3 K =** to store **+3** as a constant operation. Then type **4=** to get 7.

Interest Rate Conversion

Convert between nominal and effective interest rates by entering the known rate and the number of periods per year, then touch the unknown rate key.

NOM%

store/solve the nominal interest rate

EFF%

store/solve the effective interest rate

Amortization

First calculate a payment using the TVM operations. Then enter the beginning period, **INPUT** then the ending period. Finally touch **AMORT**. Touch **=** to switch between displaying the period, principal, interest and balance. Touch **AMORT** a second time to advance to next period.

Cash Flow Analysis

Up to 80 cash flows can be entered using **CFj** and **Nj**. Start by touching **C All**. Enter the first cash flow and touch **CFj**. If the cash flow occurs multiple consecutive times, enter the repeat value and touch **Nj.** Repeat for all cash flows.

IRR/YR
computes internal rate of return per year for the cash flow.

NPV
computes the net present value of the cash flow based on the interest rate currently stored in **I/YR**.

Statistics Functions

CLΣ
clears statistics registers n,∑x,∑x²,∑y,∑y²,∑xy

Σ+
accumulates x,y in registers, returns n
(enter x, INPUT then y)

Σ-
removes x,y from registers, returns n
(enter x, INPUT then y)

x,y
mean of x,y

x,w
weighted mean

x̂,r
linear estimate x for y, correlation coefficient

ŷ,m
linear estimate y for x, slope

Sx,Sy
standard deviation x,y

σx,σy

population standard deviation x,y

Σn

recalls number of entries

Σx

recalls ∑x

Σx²

recalls ∑x²

Σy

recalls ∑y

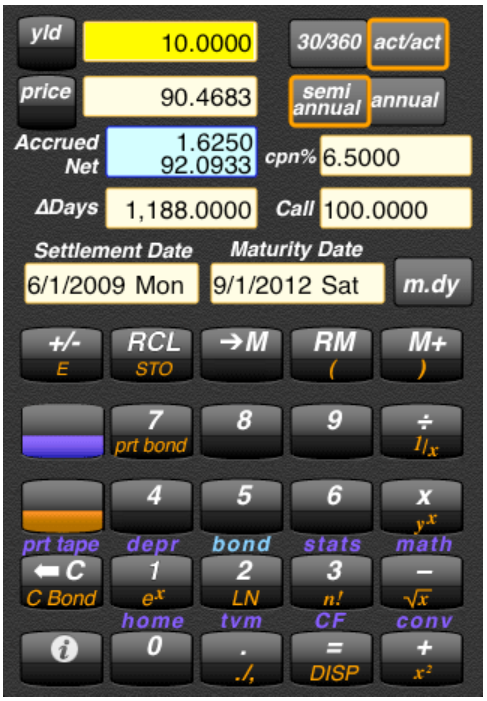
Σy²

recalls ∑y²

Σxy

recalls ∑xy

Bond Keyboard



Select the bond keyboard by touching **blue bond**.

prt bond

prints bond information to the print tape

30/360

sets calendar basis to a 30-day month and a 360-day year

act/act

sets calendar basis to actual days for months and years

semi annual

sets semi-annual coupon payments

annual
sets annual coupon payments

cpn%
sets annual coupon rate as a percentage

Call
stores the call price per $100 face value.

Settlement Date
stores the settlement (purchase) date.

Maturity Date
stores the maturity date or call date. The call date must coincide with a coupon date.

m.dy/d.my
sets the date for entering dates in the settlement and maturity fields to either m.ddyyyy or d.mmyyy

ΔDays
displays the number of days between settlement date and maturity date. If you enter a value in **ΔDays**, maturity date is set to the settlement date plus the entered value.
Note: the number of days is computed using the current calendar basis (30/360 or act/act).

yld
calculates the yield (as an annual percentage) to maturity or yield to call date.

yld field
stores a yield value.

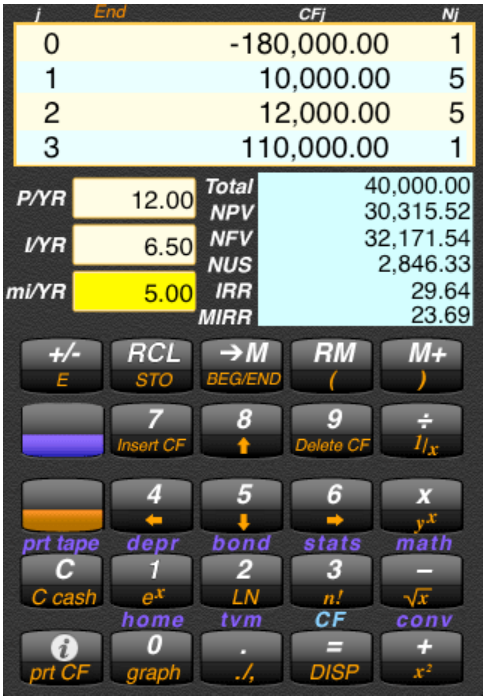
price
calculates the price per $100 face value.

price field
stores a price value.

Accrued
displays the interest accrued from the last coupon-payment date until the settlement date, per $100 face value.

Net
displays **price** + **accrued**

Cash Flow Keyboard



Select the cash flow keyboard by touching **blue CF**.

The cash flow keyboard displays up to 80 cash flows in a scrolling list. Touch the list and move your finger up/down to scroll. Touch an entry to high light it for editing. To edit successive cash flows, use the **=** key to move between flows. The orange arrow keys move up/down/left/right in the scrolling list.

As entries are added or modified the following are computed and displayed:

total the total of the cash flows
NPV net present value of the cash flows using I/YR
NFV net future value (future value of the net present value)
NUS net uniform series (the amount of constant, equal cash flows having a present value equivalent to the net present value).
IRR internal rate of return
MIRR modified internal rate of return (see below)

Touch the **P/YR** field to enter the periods per year
Touch the **I/YR** field to enter the interest rate per year
Touch the **mi/YR** field to enter the "safe" interest rate for the MIRR calculation. (see below)

InsertCF inserts an empty cash flow at the current edit location in the list. Cash flow 79 is lost.
DeleteCF deletes the current cash flow line and moves all the lines above down. An empty cash flow is added to entry 79.
graph displays a graph of the NPV vs interest rate for the current cash flow. Pinch the display to scale up or down. Swipe the display to scroll.

prt CF prints the cash flows to the paper tape

Note: Certain cash flows can generate more than 1 solution for the internal rate of return calculation. The IRR field will show all the values found. Touch the IRR field to move the found interest rate(s) to the I/YR field for further calculations.

MIRR computes a modified internal rate of return based on the following: MIRR = 100 ((PositiveNFV / -NegativeNPV)^1/n - 1) where:

PositiveNFV = future value of positive cash flows using the I/YR rate.

NegativeNPV = net present value of negative cash flows using the mi/YR rate.

Conversion Keyboard

Select the conversion keyboard by touching **blue conv**.

Over 100 commonly used conversion factors are stored in the calculator and are accessed using the scroll wheels of the conversion keyboard.

Scroll the left most scroll wheel to select the type of conversion. Then scroll the middle and right scroll wheels to select the units to convert between. Enter the quantity to be converted in the display and then touch either the left or right pink button to compute the conversion in the direction indicated by the touched button.

The conversion is applied and the lastOp annunciator shows the units and direction of conversion.

The Money conversions use rates loaded from the International Monetary Fund web site:

http://www.imf.org/external/np/fin/data/rms_rep.aspx

To update the rates, press the i button, then select Settings and touch the Update Currency Rates button. You must have an active internet connection for the rates to download. The date of the last download is displayed below the button. The downloaded rates are retained in the calculator until the next time the download button is touched so they can be used when you are not connected to the internet. The IMF site does not update all rates every day. 10BIICalc finds and stores the most recently reported rate for each currency.

Depreciation Keyboard

Select the depreciation keyboard by touching **blue depr**.

basis
: stores the depreciable cost basis of the asset.

salv.
: stores the salvage value of the asset at the end of its useful life.

life
: stores the expected useful life (in whole years) of the asset.

fact%
: stores the declining-balance factor as a percentage of the straight-line rate.

acrs%
: stores the Accelerated Cost Recovery System percentage from the published ACRS tables.

DB

compute depreciation with declining balance method. Enter the year to calculate for followed by **DB**. The depreciation amount will be displayed. The second numeric display line shows the remaining depreciable value. Touch **DB** again to calculate the following year.

SOYD

compute depreciation with sum of years digits method. Enter the year to calculate for followed by **SOYD**. The depreciation amount will be displayed. The second numeric display line shows the remaining depreciable value. Touch **SOYD** again to calculate the following year.

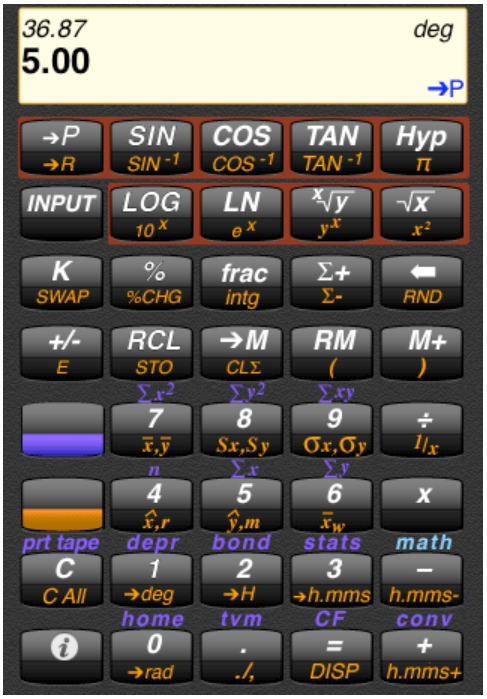
SL

compute depreciation with straight line method. Enter the year to calculate for followed by **SL**. The depreciation amount will be displayed. The second numeric display line shows the remaining depreciable value. Touch **SL** again to calculate the following year.

ACRS

compute **ACRS** deduction based on values stored in **basis** and **acrs%**.

Math Keyboard



Select the math keyboard by touching **blue math**.

Math Functions

ln

natural log for x > 0

log

logarithm base 10 for x > 0

x√y
: x root of y (if y < 0 x must be an odd integer)

√x
: square root of x for x ≥ 0

e^x
: natural antilog

10^x
: base 10 antilog

y^x
: y raised to x (if y < 0 x must be integer ≥ 0)

x^2
: x squared

1/x
: reciprocal (x ≠ 0)

frac
: fractional part of x

intg
: integer part of x

n!
: gamma function Γ(x+1) of non integer x

Trig Functions

sin
: sin(x)

cos
: cos(x)

tan
: tan(x)

sin-1
: arc sin(x) for |x| ≤ 1

cos-1
: arc cos(x) for |x| ≤ 1

tan-1
: arc tan(x)

Hyp
: prefix for hyperbolic functions

→rad
: convert x from degrees to radians

→deg
: convert x from radians to degrees

→R
: convert (r, Θ) in polar coordinates to (x,y) rectangular coordinates. Key sequence: Θ **INPUT** r **→R** yields y. Touch **SWAP** for x

→P
: convert (x,y) in rectangular coordinates to (r, Θ) polar coordinates. Key sequence: x **INPUT** y **→P** yields r. Touch **SWAP** for Θ

→H
convert x to decimal hours

→Hms
convert x to H.mmss

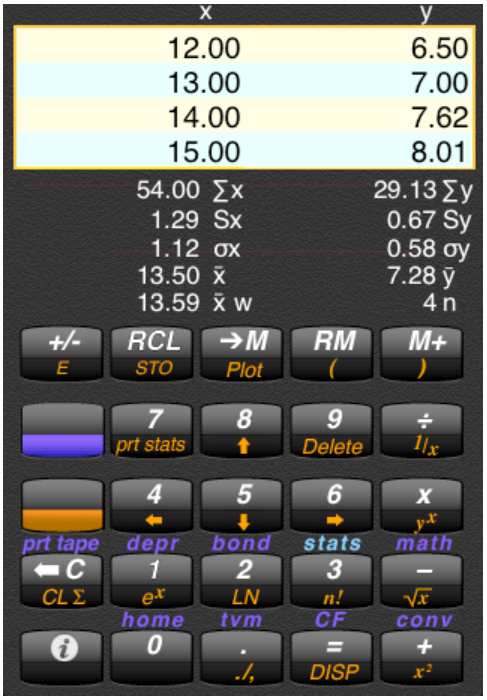
Hms+
y + x where x,y are in H.mmss

Hms-
y - x where x,y are in H.mmss

π
constant Pi

note: arguments and results of trig functions are in radians, degrees or grads depending on the setting of the angle annunciator in the display. Touch the annunciator to change the angle mode.

Stats Keyboard



Select the statistics keyboard by touching **blue stats**. The stats keyboard displays a scrolling list of samples at the top of the screen. A yellow hi light box indicates where keyboard entry will go. Use the arrow keys to move the hi light box. You can also select a sample by touching it. Up to **200** samples can be stored and edited at a time. To edit a sample, select it and type in a new value. To delete a sample, select it and touch **Delete**

Immediately below the sample list are the computed metrics for the current samples. The values displayed are automatically updated when ever you edit the samples list.

Σx, Σy
: display the totals of the x and y samples

Sx, Sy
: display the standard deviation

σx, σy
: display the population standard deviation

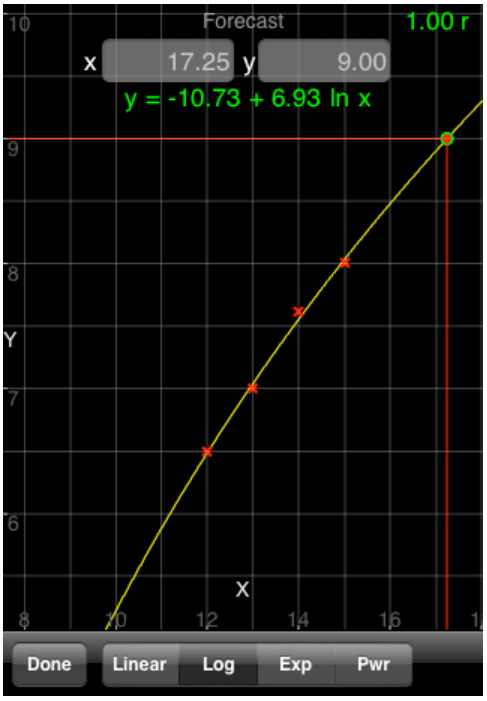
xbar, ybar
: display the mean

xbar w
: displays the weighted mean

n
: displays the number of samples

Touch the **Plot** key to generate a plot of the samples.

Plot Display



The plot display draws the samples as red x's and a yellow fit line on a cartesian plane. You can scroll the plot using a finger swipe motion. The axis scales can be adjusted independently using a pinch gesture.

prt stats

prints stats information to the print tape

Touch the buttons at the bottom of the screen to select a curve fit model:

Linear

computes and draws a linear curve fit
y = b + mx

Log

computes and draws a logarithmic curve fit
y = b + m ln x

Exp

computes and draws an exponential curve fit
y = b e^mx

Pwr

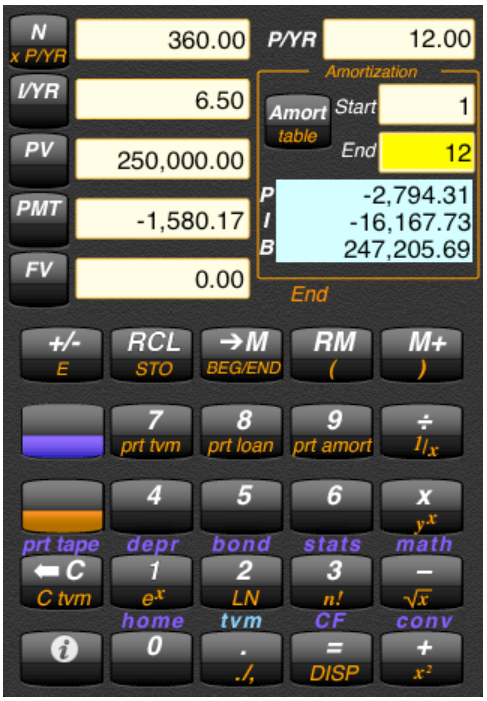
computes and draws a power curve fit
y = bx^m

To compute a forecasted value using the current curve fit model, touch either the x or y edit field. A numeric keypad will appear. Enter the value and touch the Done key. The forecast value will be computed and displayed in the opposite edit field. The forecast point will be displayed on the fit curve circled in green.

Immediately below the edit fields is a green display of the currently selected fit model. In the upper right corner of the display the correlation coefficient of the current fit model is displayed in green.

When you are finished viewing the plot, touch the Done button in the lower left to return to the stats keyboard.

tvm Keyboard



Select the tvm keyboard by touching **blue tvm**.

The tvm keyboard displays all the values used in solving the time value of money equations and allows direct entry of any value. Touch a value to select it for editing (it will high light with yellow) then enter a value from the keyboard.

To solve for a value touch the key next to it. The amortization area displays the payment, interest and balance for the specified begin and end periods.

N
: compute the number of periods

xP/YR
: multiplies N by number of periods

I/YR
: computes interest per year

PV
: computes present value

PMT

computes payment

FV

computes the future value

P/YR

stores/displays the number of periods in a year

AMORT

computes the amortization using current pmt

table

displays the amortization table

prt tvm

prints the TVM variables to the print tape

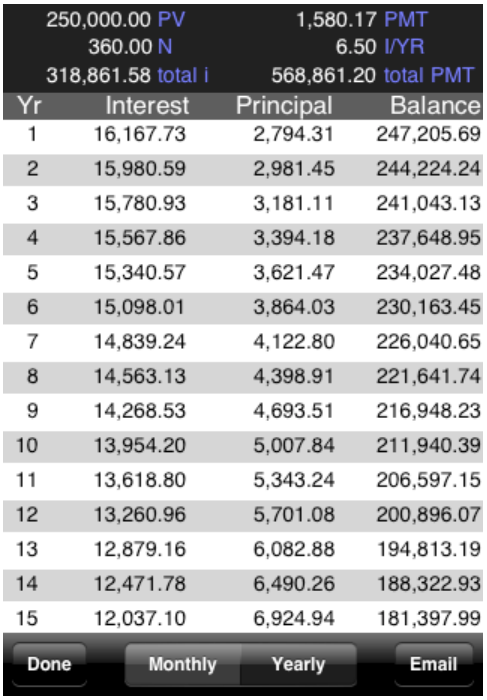
prt loan

prints loan information to the print tape

prt amort

prints a loan amortization table to the print tape

Amortization Table



Select the amortization table by touching **orange table** (**orange** shift **AMORT** on the **tvm** page).

The amortization table page displays the interest, principal and the remaining balance for each period of a loan.

Email

touch this button to email the amortization table

Monthly

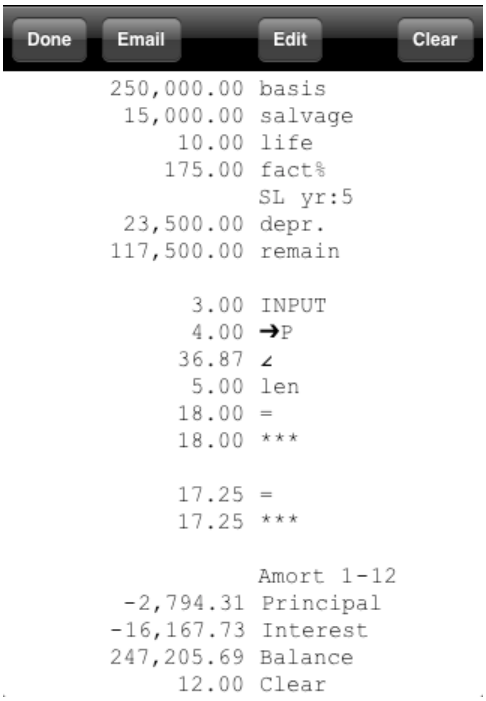
when selected, all periods are displayed

Yearly
when selected, each line summarizes the total of the payments for each year

Done
touch this button to return to the tmv page.

Note: if P/YR is set to 1, ie annual payments are specified, the Monthly / Yearly selector is not available.

print tape



Select the print tape by touching **blue prt tape**.

The print tape keeps a running audit of the last 400+ keyboard operations. Operations beyond the last 400 are dropped off the top of the tape. The print tape can be scrolled up and down by swiping with your finger. Touch the Edit button to bring up the keyboard for edits. You can insert annotations by typing on the keyboard. The standard iPhone 3.0 cut/copy/paste operations are also supported.

Control buttons

Edit
Touch the edit button to enable editing and show the keyboard.

Hide Keyboard
Touch to end editing and hide the keyboard.

Email
Touch the email button to email the print tape. Fill in the To field and then touch Send.

Clear

Touch the clear button to erase the print tape.

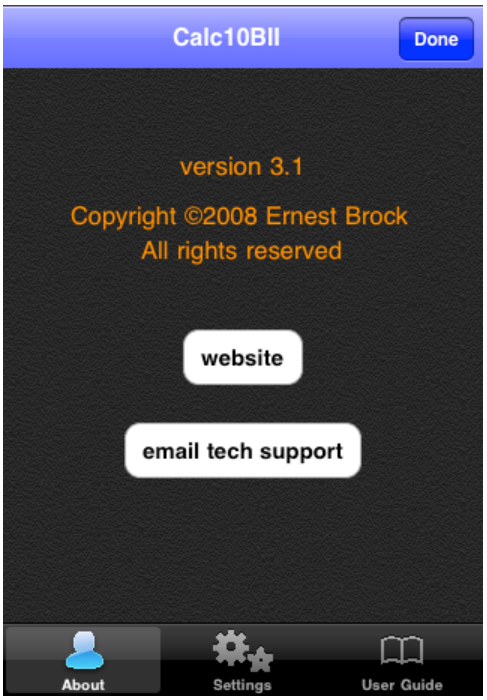
Done

Touch the done button to dismiss the print tape.

Information Screens

touch i in lower left corner to flip to information screens

About



version

displays Calc10BII version number

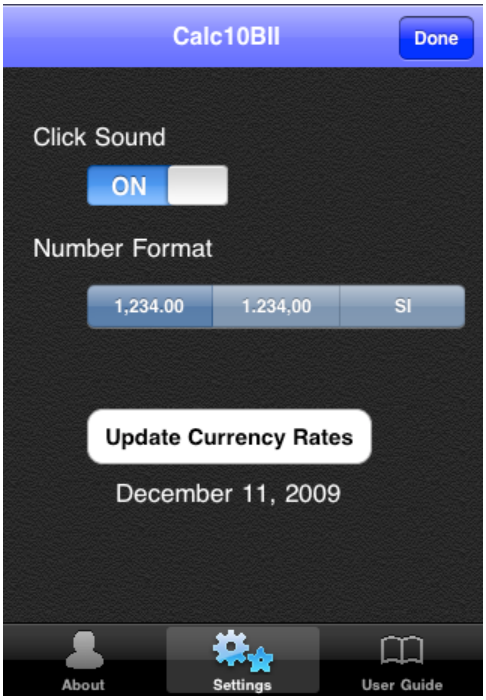
website

touch to view Calc10BII web site

email tech support

touch to open an email to Calc10BII tech support.

Settings



•click sound

turn on/off keyboard click sound

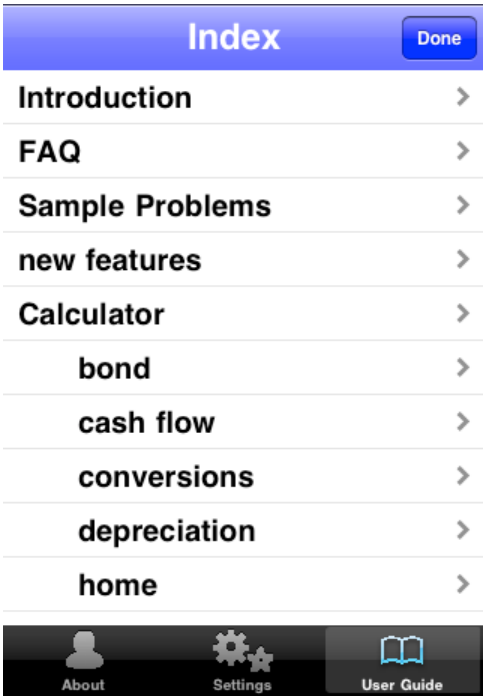
•number format

select between comma or period for separator between each 3 digits of mantissa and decimal radix character. The SI format inserts a space between each 3 digits of the mantissa and the fraction.

•Update Currency Rates

touch this button to initiate a download of the latest currency rates. You must have an active internet connection for this function to operate. This operation may take some time depending on your connection speed. The date when the currency rates were posted is displayed under the button.

User Guide



The User Guide contains the contents of this manual. Start at the Index page and select a topic. When you are done reading a topic, touch the Index button at the top of the pate to return to the index or touch the Done button to return to the calculator.

Sample Problems

Setting up the calculator

The following steps should be used before working any problem.

1. Set the number of decimal places
Touch **disp** (orange shift = key) followed by the number of decimal places you want to view. For most situations, set this to 2 decimal places by touching: **`disp 2`**

2. Set the number of payments per year (P/Y)
Touch **P/YR** (orange shift PMT key) followed by the number of payments per year. The new value is displayed on the top display line so you can easily see what the current setting is. *(Do not confuse this function with the xP/YR function which is under the N key.)*

3. Set the annuity due (Begin) and ordinary annuity (END) mode
The current setting of the mode is displayed under in the top right of the display area. To change it, touch **BEG/END**. The value will alternate between Begin and End each time you invoke this function.

4. Clear the time value of money registers
Touch **C All** This function clears N, I/Y, PV, PMT and FV, but leaves P/Y at the current setting.

Time Value of Money (TVM) Computations

Lump Sums

Lump sum computations take into consideration the change in value over time of a single sum invested at a given rate of return. These type of problems involve the 4 basic variables:

N the life of the investment
I/YR the interest rate
PV the present or starting value of the investment
FV the future or ending value of the investment

Enter any three of the variables and then solve for the 4th variable.

1. Future Value (FV)

If you have $5,000 to invest at 6.5% per year, how much would your investment be worth at the end of 5 years?

If the calculator screen is not already displayed, touch the **blue** shift key and then **home** (0 key). Then touch the following keys:

`C All`	*clear the financial registers*
`1 P/YR`	*set the periods per year to 1*
`5 N`	*set the number of periods to 5*
`6.5 I/YR`	*set the interest rate to 6.5*

5000+/- PV	*set the present value to -5,000*
FV	*compute the future value*

The result is 6,850.43

2. Present Value (PV)

Your daughter will be attending college in 12 years and you have determined that she will need $125,000 to pay for tuition, room and board and books. If you can earn an average annual rate of return of 6% per year, how much money would you need to invest today as a lump sum?

Touch the following keys:

C All	*clear the financial registers*
1 P/YR	*set the periods per year to 1*
12 N	*set the number of periods to 12*
6 I/YR	*set the interest rate to 6*
125000 FV	*set the future value to 125,000*
PV	*compute the present value*

The result is -62,121.17. Note that the result is negative. Cash flows that are paid out are generally specified as a negative value and cash returned as a positive value. In this case, you pay some amount of money into an investment (negative amount) and receive an amount some time in the future (a positive amount).

3. Number of Periods (N)

If your daughter were to attend a private college the expenses would be greater than the above example. You estimate that she would need $200,000. If you have $60,000 to invest at 8%, how many years before she attends college would you have to begin her college savings plan?

Touch the following keys:

C All	*clear the financial registers*
1 P/YR	*set the periods per year to 1*
8 I/YR	*set the interest rate to 8*
60000+/- PV	*set the present value to -60,000*
200000 FV	*set the future value to 200,000*
N	*compute the number of years*

You will have to start the savings plan 15.64 years before she attends college.

3. Interest Rate (I/YR)

You have financial commitments that prevent you from investing in your daughter's college fund until 12 years before she will attend college. At that time you will be able to invest $70,000. What interest rate will be required for her fund to grow to $125,000 in time for her to attend college?

Touch the following keys:

C All	*clear the financial registers*
1 P/YR	*set the periods per year to 1*
12 N	*set the number of years to 12*
70000+/- PV	*set the present value to -70,000*
125000 FV	*set the future value to 125,000*
I/YR	*compute the interest rate*

You will need to find an investment that returns 4.95% to attain your goal.

Regular Annuities

A regular annuity is a series of equal cash flows occurring at equally spaced time intervals. In a regular annuity, the first cash flow occurs at the **END** of the first period. An annuity due is similar to a regular annuity, except that the first cash flow occurs immediately (**BEGIN**).

Similar to the lump sum computations, the annuity calculations involve the N, I/Y, PV and FV variables. In addition, they include the PMT variable. To compute an annuity problem, you must enter 4 of the following 5 variables before solving for the 5th:

N	the life of the investment
I/YR	the interest rate
PV	the present or starting value of the investment
FV	the future or ending value of the investment
PMT	the regular payment

1. Future Value (FV)

If you are making a regular payment and want to compute the sum of the payments with interest some time in the future you need to solve for Future Value.

You can set aside $5,000 per year towards your daughter's college fund. If you establish her fund 10 years before she attends college and receive an average annual rate of return of 5.6%, how much money will she have for paying her expenses?

Make sure **End** is displayed in the upper left corner of the display. If **Begin** is shown there, touch **BEG/END** to set end mode. Then touch the following keys:

C All	*clear the financial registers*
1 P/YR	*set the periods per year to 1*
10 N	*set the number of periods to 10*
5.6 I/YR	*set the interest rate to 5.6*
5000+/- PMT	*set the payment to -5,000*
FV	*compute the future value*

She will have $64,678.99. Note that the payment is specified as a negative amount because it is a cash outflow from your pocket to the savings plan.

Suppose you establish the savings plan the same as above, but make monthly contributions of $420. How much money will be accumulated at the end of 10 years?

Make sure **End** is displayed in the upper left corner of the display. If **Begin** is shown there, touch **BEG/END** to set end mode. Then touch the following keys:

C All	*clear the financial registers*
12 P/YR	*set the # payments per year to 12*
10 ×P/YR	*set the # of periods to 10 × 12 = 120*
5.6 I/YR	*set the interest rate to 5.6*
420+/- PMT	*set the payment to -420*
FV	*compute the future value*

She will have $67,355.42.
Note: the **×P/YR** (the shift function of the N key) multiplies the value in the display by the current P/YR value and stores the result in the N variable. This is a short cut for entering N when the number of payments per year is greater than 1. You could have computed the value in your head and entered 120 N instead.

2. Payment (PMT)
Solving for an annuity payment is the process used for computing a home or car loan payment or for determining the the amount you need to save each year to reach a financial goal.

You are about to purchase a new home. The selling price is $375,000 and the bank is willing to loan you the money at an annual interest rate of 7.2%. What will your monthly payments be on a 15 year loan?

Make sure **End** is displayed in the upper left corner of the display. If **Begin** is shown there, touch **BEG/END** to set end mode. Then touch the following keys:

C All	*clear the financial registers*
12 P/YR	*set the # payments per year to 12*
15 ×P/YR	*set the # of periods to 10 × 15 = 180*
7.2 I/YR	*set the interest rate to 7.2*
375000 PV	*set the present value to 375,000*
0 FV	*you will pay the loan to 0 in the future*
PMT	*compute the future value*

Your monthly payments will be -3,412.68

An alternative way to solve this problem is to use the tvm screen. Touch **blue tvm** to display the tvm screen. You will notice that the values from the above problem have already been filled into the fields on the tvm screen. Touch **table** (under the Amort button). The payment schedule is displayed in a scrolling list showing the interest paid, principal paid and remaining balance for each payment. The total amount of interest paid over the life of the loan is show in the "total i" field just above the list. You can email the amortization schedule to yourself or a client by touching the email button.

To return to the home screen, touch the Done button to dismiss the amortization display and then touch **blue home**.

3. Number of Periods (N)

If you need to find out how long it will take, you are solving for the number of periods.

You have retirement savings of $1,200,000. You have determined that you need $85,000 per year to live on. If you expect to earn 5.6% per year on average, how many years will your retirement fund last?

Make sure **End** is displayed in the upper left corner of the display. If **Begin** is shown there, touch **BEG/END** to set end mode. Then touch the following keys:

C All	*clear the financial registers*
1 P/YR	*set the # payments per year to 1*
5.6 I/YR	*set the interest rate to 5.6*
1200000+/- PV	*set the present value to -1,200,000*
85000 PMT	*set the payment to 85,000*
N	*compute the number of payments*

Your retirement fund will last 28.69 years.

4. Interest Rate (I/YR)

You are offered an investment that costs $50,000 that will pay 5,000 per year for 15 years. At the end of the 15 years it can be redeemed for 10,000. What is your annual rate of return?

Make sure **End** is displayed in the upper left corner of the display. If **Begin** is shown there, touch **BEG/END** to set end mode. Then touch the following keys:

C All	*clear the financial registers*
1 P/YR	*set the # payments per year to 1*
15 N	*set the number of years to 15*
50000+/-PV	*set the present value to 50,000*
5000 PMT	*set the payment to 5,000*
10000 FV	*set the future value to 10,000*
I/YR	*compute the interest rate*

The investment returns 6.76% annually.

5. Annuity Due

Annuities due differ from ordinary annuities because the first payment is made at the beginning of the year instead of the end. To solve annuity due problems, you must change the end/begin computation mode to begin. You do this by touching **BEG/END** until the upper right corner of the display show Begin.

You are about to purchase a new home. The selling price is $375,000 and the bank is willing to loan you the money at an annual interest rate of 7.2%. What will your monthly payments be on a 15 year loan?

Make sure **End** is displayed in the upper left corner of the display. If **Begin** is shown there, touch **BEG/END** to set end mode. Then touch the following keys:

C All	*clear the financial registers*
12 P/YR	*set the # payments per year to 12*
15 ×P/Y	*set the # of periods to 10 × 15 = 180*
7.2 I/YR	*set the interest rate to 7.2*
375000 PV	*set the present value to 375,000*
0 FV	*you will pay the loan to 0 in the future*
PMT	*compute the payment*

Your monthly payments will be -3,412.68

What will your payments be if you make the payments at the beginning of each month instead of the end of the month?

Using the same setup as above, change the end/begin mode to begin by touching **BEG/END**. The upper right line of the display should show Begin. Solve for payment:

PMT	*compute the future value*

Your monthly payments will be -3,392.32. By making payments early, you save 20.35 per payment.